RECORD OF DECISION
DECLARATION
INITIAL SOURCE CONTROL OPERABLE UNIT

SITE NAME AND LOCATION

Hastings Ground Water Contamination
Colorado Avenue
Hastings, Nebraska

STATEMENT OF BASIS AND PURPOSE

This decision document represents the selected remedial action for the Colorado Avenue, subsite of the Hastings Ground Water Contamination site, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan.

This decision is based upon the contents of the administrative record for the Colorado Avenue site.

The State of Nebraska concurs on the selected remedy.

DESCRIPTION OF THE REMEDY

This initial source control operable unit was developed to protect public health and the environment by controlling the migration of contaminants present in the soils which overlie the aquifer. Prior to implementation of a full scale remedy, a pilot-scale test will be undertaken. The operable unit is fully consistent with all planned future site activities. Future site activities will be addressed in subsequent Records of Decision and will include a decision on possible remediation of contaminated ground water for this subsite.

The major components of the selected remedy are as follows:

- Extraction of volatile contaminants from the silt and sand unsaturated zones;
- Monitoring contaminants in the soils above the aquifer; and
- Monitoring ground water contamination at the site.

DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate to the remedial action and is cost-effective. This remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity mobility or volume as a principal element and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. This remedy will mitigate future releases to the ground water, however, this action will not address other contaminant source areas. Due to its limited scope of migration control, this remedy does not address remediation of the ground water. Subsequent actions are planned for the site that will address all remaining concerns.

9-28-88

Date

Signature (RA/AA)

Attachments: Index to Administrative Record
Decision Summary
Responsiveness Summary

RECORD OF DECISION

DECISION SUMMARY

HASTINGS GROUND WATER CONTAMINATION

COLORADO AVENUE SUBSITE

HASTINGS, NEBRASKA

Prepared By:

U.S. Environmental Protection Agency

Region VII

Kansas City, Kansas

September 1988

Record of Decision

Decision Summary

Contents

DECISION SUMMARY
COLORADO AVENUE SUBSITE
HASTINGS GROUND WATER CONTAMINATION

SITE DESCRIPTION

The Colorado Avenue subsite of the Hastings Ground Water Contamination site is located in the City of Hastings, Adams County, Nebraska. Adams County has an estimated population of 30,000 and is in south central Nebraska. The locations of Adams County and Hastings are shown by Figure 1.

The Colorado Avenue subsite is a part of the Central Industrial Area which contains commercial and industrial properties situated along the Burlington-Northern railroad right-of-way. Residential properties are located immediately south and east of the Colorado Avenue site.

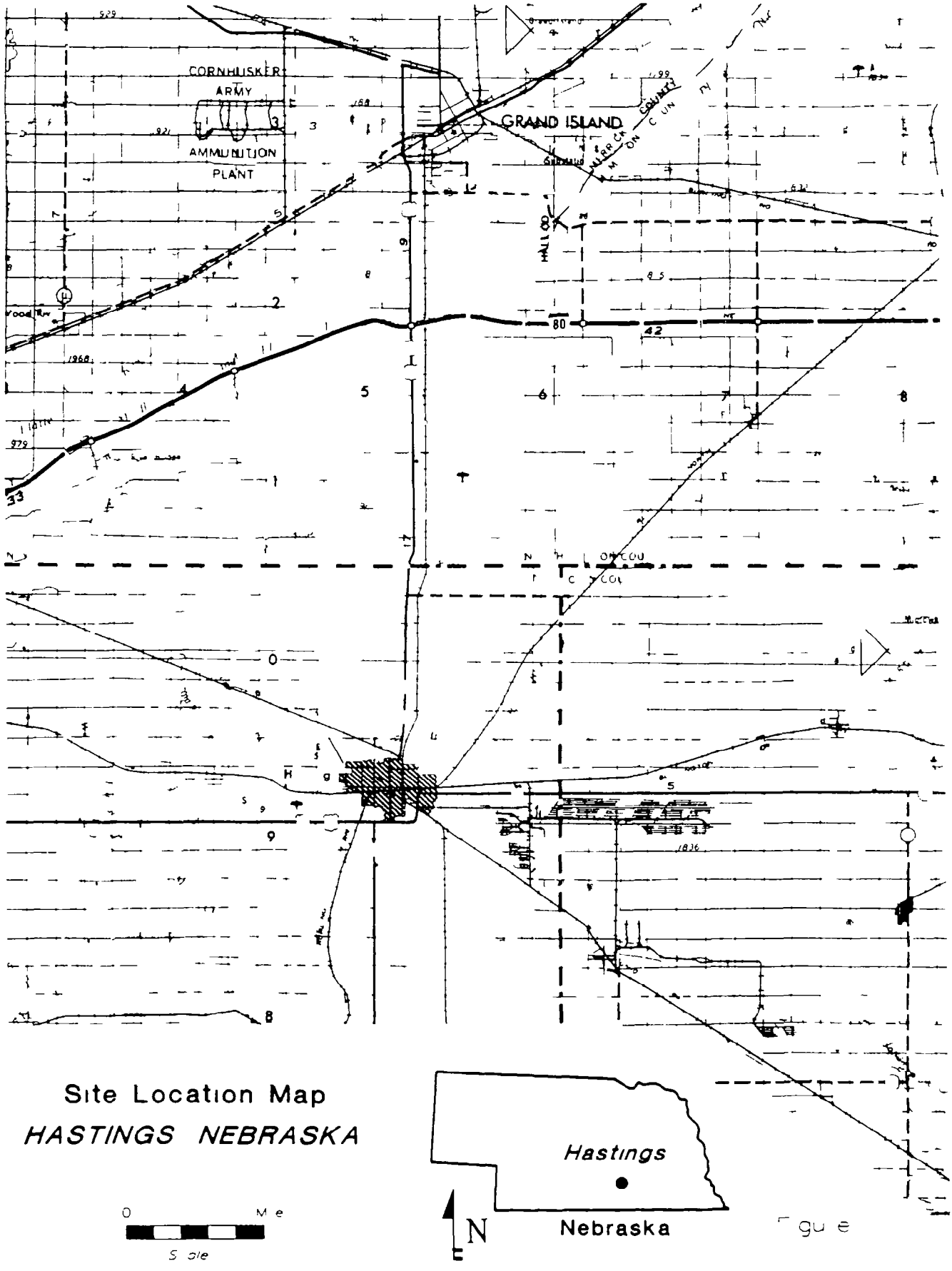
Three industrial properties are included within the site. These properties, along with the city's right-of-way for public access and public utilities, will be impacted by the source control remedy. The property known as 108 South Colorado consists of a main brick building and several additions known to be over 25 years old. The 108 South Colorado property was used by Dravo Corporation from 1967 to May 1982. Dravo Corporation manufactured heating and air conditioning equipment at this plant site and used a vapor-degreasing process to clean metals prior to finishing. Waste solvents were discharged into the sanitary sewer and the storm sewer at the site. These sewers are shown on Figure 2.

The Burlington-Northern railroad right-of-way adjoins the 108 South Colorado property to the north. The right-of-way is 200 feet wide and is a major east-west transportation route.

Across the street east from the 108 South Colorado property is the Zuber Company, a metal recycling business. The Zuber Company leases Burlington-Northern Railroad (B-N) property which adjoins it on the north. The leased property is used for storage of salvage metals and staging of metals for loading onto rail cars for shipping.

Information available to the Agency indicates the Zuber Company has not used chemical solvents and has not accepted any hazardous wastes from the manufacturing operations at 108 South Colorado.

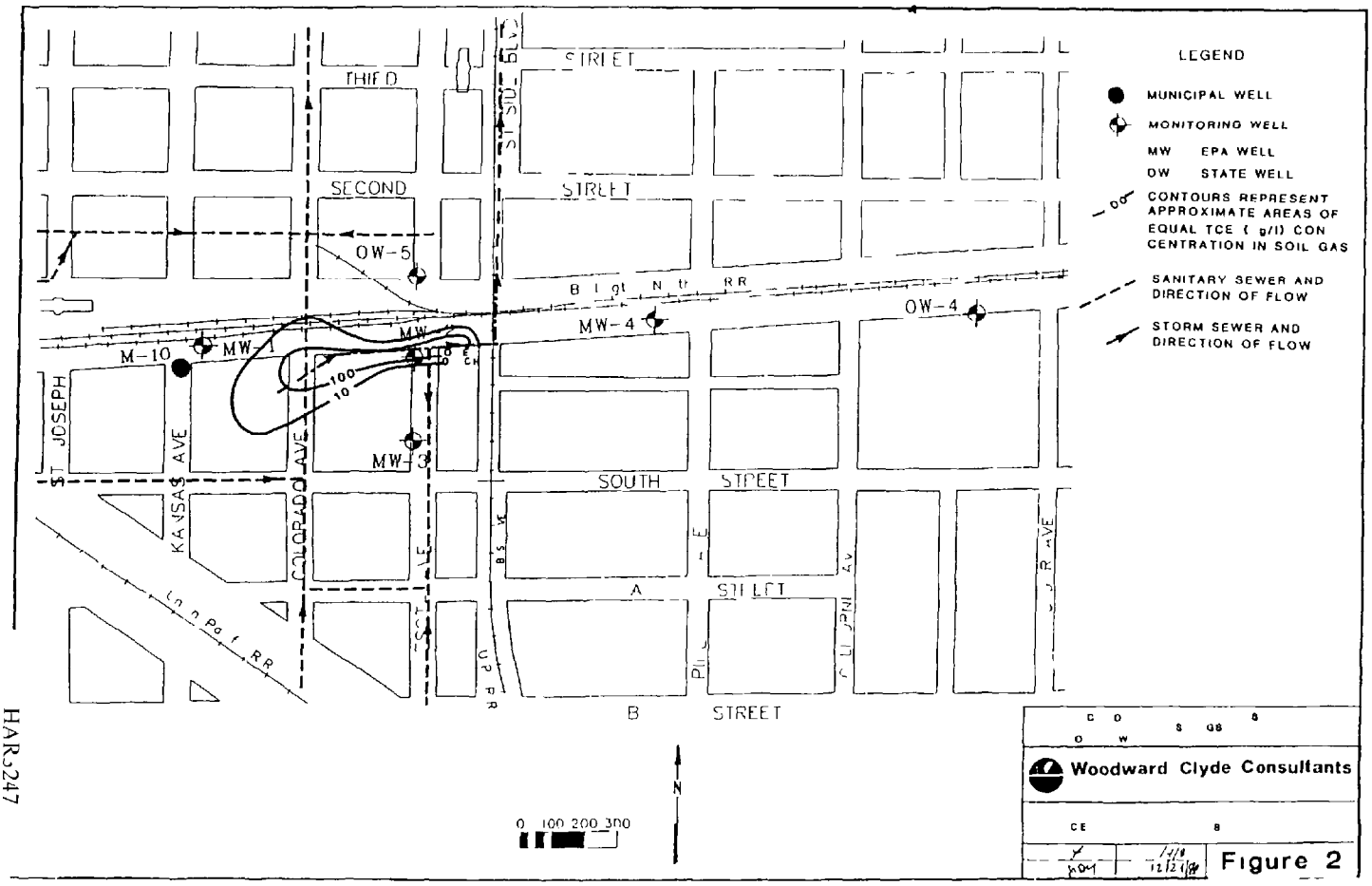
A storm sewer was constructed from the 108 South Colorado property, eastward across B-N property. This sewer carries surface water and roof drainage (rain water) from the main building at 108 S. Colorado. According to information provided by Dravo Corporation, there are several breaks in the storm sewer. This supports EPA's conclusion that the contamination found in soils on the B-N Railroad property is a result of industrial discharges to the storm sewer previously described.



Site Location Map

HASTINGS NEBRASKA

HAR3246


THIRD
STREET
SECOND
STREET
OW-5
MW-4
OW-4
M-10
MW-1
MW-2
MW-3
100
10
ST JOSEPH
KANSAS AVE
COLORADO AVE
SOUTH
STREET
A
STREET
B
STREET
LEGEND
MUNICIPAL WELL
MONITORING WELL
MW EPA WELL
OW STATE WELL
CONTOURS REPRESENT APPROXIMATE AREAS OF EQUAL TCE (g/l) CON CENTRATION IN SOIL GAS
SANITARY SEWER AND DIRECTION OF FLOW
STORM SEWER AND DIRECTION OF FLOW
0 100 200 300
N
Woodward Clyde Consultants
Figure 2

HAR3247

The Union Pacific right-of-way is located east of the Zuber Company properties This track is a major north-south transportation route

Hastings municipal well number 10 is located one block west of Colorado Avenue at the intersection of Kansas Avenue and the Burlington-Northern tracks Decommissioned Hastings municipal well number 18 is located approximately 1/2 mile east of the Colorado Avenue site Hastings municipal well number 7 is located approximately 4 500 feet north-east of the site Hastings municipal well number 20 is located approximately 3 000 feet south of the site

SITE HISTORY

Hastings Municipal Well number 18 had not been used for approximately 30 years when in March 1983 the city attempted to put the well into service Following start-up complaints of foul taste and odor resulted in the well being permanently removed from service That same year the Nebraska Department of Health (NDOH) and the Nebraska Department of Environmental Control (NDEC) began investigating wide-spread ground water contamination in the Hastings area

During this investigation samples collected from well number 18 indicated that the well was contaminated with several compounds primarily chlorinated solvents including trichloroethene (TCE) 1 1 1-trichloroethane (TCA) and tetrachloroethane (PCE) Subsequent to discovery of these contaminants in well 18 Marshalltown Instruments Company purchased the former Dravo Corporation property at 108 S Colorado

In 1984 the State of Nebraska installed five pairs of monitoring wells in the City of Hastings

The EPA began sampling wells in 1985 Field investigations were conducted during 1986 to identify and characterize suspected source areas

The Colorado Avenue site was identified by EPA in 1986 as the source of high levels of TCE found in well #18 The Colorado Avenue site includes sanitary and storm sewers which received metal degreasing (solvent) waste discharges during the 1960s and 1970s In the 1950s and early 1960s the 108 South Colorado property was occupied by a predecessor firm Hastings Industries

Hastings Industries used TCE at the site during the early-to-mid 1960s In 1967 Dravo Corporation purchased Hastings Industries The operations at 108 South Colorado subsequently became a wholly owned subsidiary of Dravo Corporation The facility at 108 South Colorado continued to use TCE in their vapor degreasing process until 1971, when Dravo Corporation switched to using 1 1 1-TCA Information available to EPA indicates that spent solvents were discharged to

the sewers at the Colorado Avenue site during the 1960s and 1970s This information is supported by results of field investigations conducted during 1986-1988 at the site

The EPA conducted soil sampling and soil-gas sampling in 1987 and 1988 to better define the extent of contamination at the site and to refine preliminary design data for the source control remedy

An Engineering Evaluations and Cost Analysis (EE/CA) was released by EPA for public comment on February 3 1988 The EE/CA described several initial response actions for thi subsite including soil vapor extraction The public comment period for this site was subsequently extended to April 30 1988 The EPA has prepared a responsiveness summary which addresses the comments received

Solid and semi-solid wastes from the vapor degreasing process were sent to municipal landfills in the Hastings area Therefore no onsite burial of wastes is suspected

There are no known direct contact health threats from contaminated soils and public access to the site is not restricted at this time

ENFORCEMENT HISTORY

In September 1985 general notice letters were issued to potentially responsible parties (PRPs) connected with the Hastings Ground Water Contamination NPL site The first PRP meeting was held in October 1985 at which time the PRPs were asked to perform the needed RI/FS studies No proposals to undertake the RI/FS were made by the PRPs

In December 1986 EPA notified Dravo Corporation and Marshalltown Instruments of their potential liability at the Colorado Avenue Site In January 1987 a PRP meeting wa held to review EPA's findings to date Dravo Corporation and Marshalltown Instruments were asked to undertake the next phase of investigations Neither party made an offer During meetings held with the PRPs in 1987 EPA requested that the needed removal actions be done by the PRPs The first offer made to EPA was by Dravo Corporation following the issuance of a special notice letter on August 25 1987 and the 60 day moratorium which followed Dravo asked to be considered for a de minimis settlement The Agency informed Dravo that it could not accept its offer as it did not meet the requisite statutory criteria for such a settlement Dravo did not counter-offer after receiving the Agency's response Dravo and Marshalltown subsequently received draft administrative orders on consent in 1988 which included inter alia source control In April 1988 Marshalltown requested its status as a PRP be reviewed and it submitted documents to support its position that it had not disposed of TCA at its facility The Agency reviewed Marshalltown's status pursuant to this request and determined

that Marshalltown was not eligible for a Section 107(b)(3) defense because it had an indirect contractual relationship with one who had disposed of TCA at the site and Marshalltown had reason to know of the disposal as that term is defined under CERCLA when it purchased the property

On April 13 1988 the Hastings PRPs met with EPA and offered to undertake a pilot study of SVE The Agency requested the PRPs submit a proposal On June 8 June 28 and July 22 1988 EPA met with the PRPs to discuss pilot scale testing for source control at the Colorado Avenue site A draft order concerning Colorado Avenue was discussed on July 22 and negotiations continued in August 1988

COMMUNITY RELATIONS

Community relations activities for the Hastings Ground Water Contamination were initiated by the EPA in 1984 with the development of a Community Relations Plan Since December 1984 EPA has conducted periodic meetings with Hastings city officials to update them regarding site work and findings

A public meeting was held in November 1985 to present site information and plans for the RI/FS In February 1987 the Report of Investigations was placed in the public information repository and was mailed to all interested parties

The EPA Region VII Public Affairs Office has mailed Fact Sheets periodically to parties who have expressed an interest in the Hastings Ground Water Contamination site This office also responds to inquiries regarding this site made by news media and members of the public

An Engineering Evaluation/Cost Analysis was released for public comment in February 1988 This document set forth EPA's proposed cleanup plans for the Colorado Avenue subsite

A public meeting was held on March 5, 1988 to discuss EPA's findings and the need for site cleanup Concerns regarding the environmental impacts of contamination and the costs of cleanup were voiced

Several issues were raised by residents during the course of the remedial investigation as well as at the most recent public meeting A responsiveness summary, which addresses the comments and questions raised is attached to this ROD

SITE CHARACTERISTICS

Investigations conducted by EPA during 1985 and 1986 are documented by Report of Investigation, Hastings Ground Water Contamination, Colorado Avenue Subsite dated February 16 1987 Data presented by this report show that the highest levels of TCE contamination in the soils and soil-gas occur along the previously described sanitary and storm sewers at the Colorado

Avenue site Approximately 70 feet of sand and sand/gravel were found above the water table

Data presented in this report also show very high levels of TCE in ground water at the site The EPA has published a maximum contaminant level (MCL) of 5 ppb for TCE The above-referenced report also contains an assessment of potential risks to human health from the contaminated ground water

As a part of the risk assessment analytical data were reviewed for surface water exposure for noncarcinogenic health effects and for direct contact to soils Because these risk levels did not pose a threat to human health the calculations were not presented in the referenced report

The amount of TCE contamination present in the ground water and in soils above the water table necessitates some response action at the Colorado Avenue site to reduce the potential carcinogenic risks to human health

The carcinogenic risks are theoretical quantifications and are reported as excess lifetime cancer risks Excess lifetime cancer risk is defined as the incremental increase in the probability of getting cancer compared to the probability if no exposure occurred For example a $1x10^{-6}$ excess lifetime cancer risk represents an exposure that could result in one extra cancer case per million people exposed

High levels of 1 1 1-trichloroethane are present in the ground water at the site This chemical is not classified as a carcinogen

Noncarcinogenic risks are determined by comparing potential doses of contaminants by site visitors to contaminant specific reference doses The reference dose is an estimate of an exposure level that would not be expected to cause adverse effects when exposure occurs

The analytical results from the site investigation and the risk assessment can be found in the referenced report for the Colorado Avenue site A brief summary of the results is presented below

Ground Water Contamination

Ground water at the site is found at a depth of approximately 125 feet The site is underlain by a sand and gravel aquifer having a saturated zone approximately 100 feet deep This aquifer is the sole source of drinking water and is used extensively for industrial and irrigation purposes The lateral flow in the aquifer was found to be generally eastward from the site However the potentiometric surface map of the area indicates the direction of flow east of the site is influenced by the regional east-southeast gradient

Ground water samples were collected from 14 downgradient monitoring wells and from public supply wells located upgradient and downgradient from the site The highest detected contaminant concentrations were seen at well MW-2 as shown in Table 1-1 Contamination with TCE TCA and PCE is seen in the shallow portion of the aquifer (125-140 ft) near the site Monitoring wells located 1 000-2 000 feet downgradient from the site have shown TCE contamination at depths of 170-180 feet The sand and gravel aquifer is underlain by thick deposits of clay and shale Depths to the clay/shale formations range from 200-220 feet Historical water quality data for Hastings municipal supply wells are given in Tables 1-2 and 1-3

Soil Contamination

Soil sampling and soil-gas sampling was performed in 1986 This sampling shows high levels of contamination in the soil-gas associated with the sanitary and storm sewers Analytical data from the soils show several localized areas of contamination which correspond to joints in the sewers where liquids can leach into the soils Figure 3 shows the proposed response area which has shown the highest levels of TCE in soil-gas Approximately 70 feet of sand and sand/gravel are present above the water table Soils found above this highly permeable zone are characterized by increasing silt and clay content moving upward to the ground surface Soil-gas sampling was conducted in 1987-88 in order to better define zones with the highest concentration of volatiles in the soils This remedy will mitigate future releases to the ground water by removing the high levels of TCE and other volatiles in the unsaturated zone */

Surface Water and Sediment Contamination

Surface water and sediments are present in an open ditch which is an outfall of the storm sewer A number of years have elapsed since TCE and TCA were discharged to the sewer Large quantities of water have passed through the storm sewer and levels of contamination present in the surface water and sediments do not present a significant risk to public health or the environment

RISK ASSESSMENT

The primary potential human health impact at the Colorado Avenue site is the exposure of residents to contaminated ground

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*/ Subsequent to publication of the EE/CA data became available to EPA which indicated high levels of volatile organic chemicals in the sand materials underlying the silt This information was discussed at the public meeting on March 5 1988 and reviewed with the PRPs at a meeting on April 13 1988

Table 1 1

Range of Concent ations of Volat le O ganic Compou ds 1
Ground Water at Colo ado Avenue Site
1985 1987
State and EPA Monitoring Wells
Concentrations (ug/l)

Param ters	OW 4(s)	OW 4(d)	OW 5(s)	OW 5(d)	MW 2	MW 3	MW 4
T chloroethylene (TCE)	ND 3 500	20 1 800	100 1 900	ND 51	up to 55 000	54 120	1 300 12 000
Tet achloroethylene (PCE)	ND 42	ND 24	ND 55	ND 2	ND 550	ND	25 77
1 1 D chloroethene	ND	ND	ND 3 5	ND	ND 290	ND	4 20
Trans 1 2 Di hl oethene	ND 34 0	ND	ND	ND	ND 9	ND 0 12	ND 81
1 1 1 T chlo oethane (TCA)	ND 40	ND 25	ND 350	ND 6	ND 960	ND	92 420

Not

G ound ter monitoring data (1985 1987) do not ind cate a specific tre d f VOC o t m ation o er time Howeve h gh contam na t concentratio s pe sisted in 1986 and 1987 (e g at MW 2 TCE was observed at 55 000 g/l in Septembe 1986 20 000 g/l D emb 1986 d 45 000 g/l Ap l 1987) D t bt d f m the REM II s te i stigatio repo t fo Colorado Avenue s bsite (Wood a d Clyde 1987a) and quarterly ground water sampling conducted in December 1986 and April 1987

(s) shallow well (120 140 feet)
(d) deep well (approximately 170 180 feet)

ND not detected

Data for other monitoring wells located east of site not sho n by this tabl

Table 1 2

Range f Concent at ons of V l tile Orga ic Compou ds i
Ground Water City of H st ngs
1983 1984

Concentrations (ug/l)

P ameters	M 3	M 7	M 10	M 11	M 12	M 18
T ichloroethylene		4 8	ND	ND	4 2	ND
(TCE)	ND	6 81	46 5	0 42	249 2	2000
T t achloroethyl			ND		ND	ND
(PCE)	ND	ND	19 6	ND	352	60 4
1 1 Dichloroethene	ND	ND	ND	ND	ND	ND
						24 6
T a s 1 2						
Dichl o thene	ND	ND	ND	ND	ND	ND
						75 7
1 1 1 Trichloro th e						
(TCA)	ND	ND	ND	ND	ND	ND
					10 4	133

es

Grou d water data (1983 1984) pr sented here r flects data from four ells (M 3 M 10 M 12 a d M 18) hich ha e si ce been taken out of egula service and/or disconnected fr m the d strib tion system Higher contam a t co centrati ns were fo nd 1983 when the wells ere in se

D t e obtained f om the REM II gro d wate i vestigation report for Hastings Ground Water Contamination May 7 1987 and qu t ly ground wate sampling co duct d s n e D emb 1986

Carbon tetrachloride ranging from 6 4 46 4 ug/l was detected in well M 3 during this period

(s) shallow ell
(d) deep ell
ND not detected
no data available

1983 and 1984 a alyses ere reported by State of Nebraska

Table 1 3

Range of Co ce t ations of Volatile Orga c Comp u ds
G ound W ter City of Hasti gs
1985 1987

Concentrations (ug/l)

Pa meters	M 3	M 7	M 10	M 11	M 12	M 15	M 18
T hlo oethylene (TCE)	ND	0 5 l 7	1 3 21	1 7	1 7	ND 0 4	ND 190
Tet achloroethylene (PCE)	ND	ND	ND	ND	ND	ND	ND
1 1 Dichloroethene	ND	ND	ND	ND	ND	ND	ND
T s 1 2 D hlo oethe e	ND	ND	ND	ND	ND	ND	ND
1 1 1 T chloroetha e (TCA)	ND	ND	ND 0 3	ND	ND 0 4	ND	ND

es

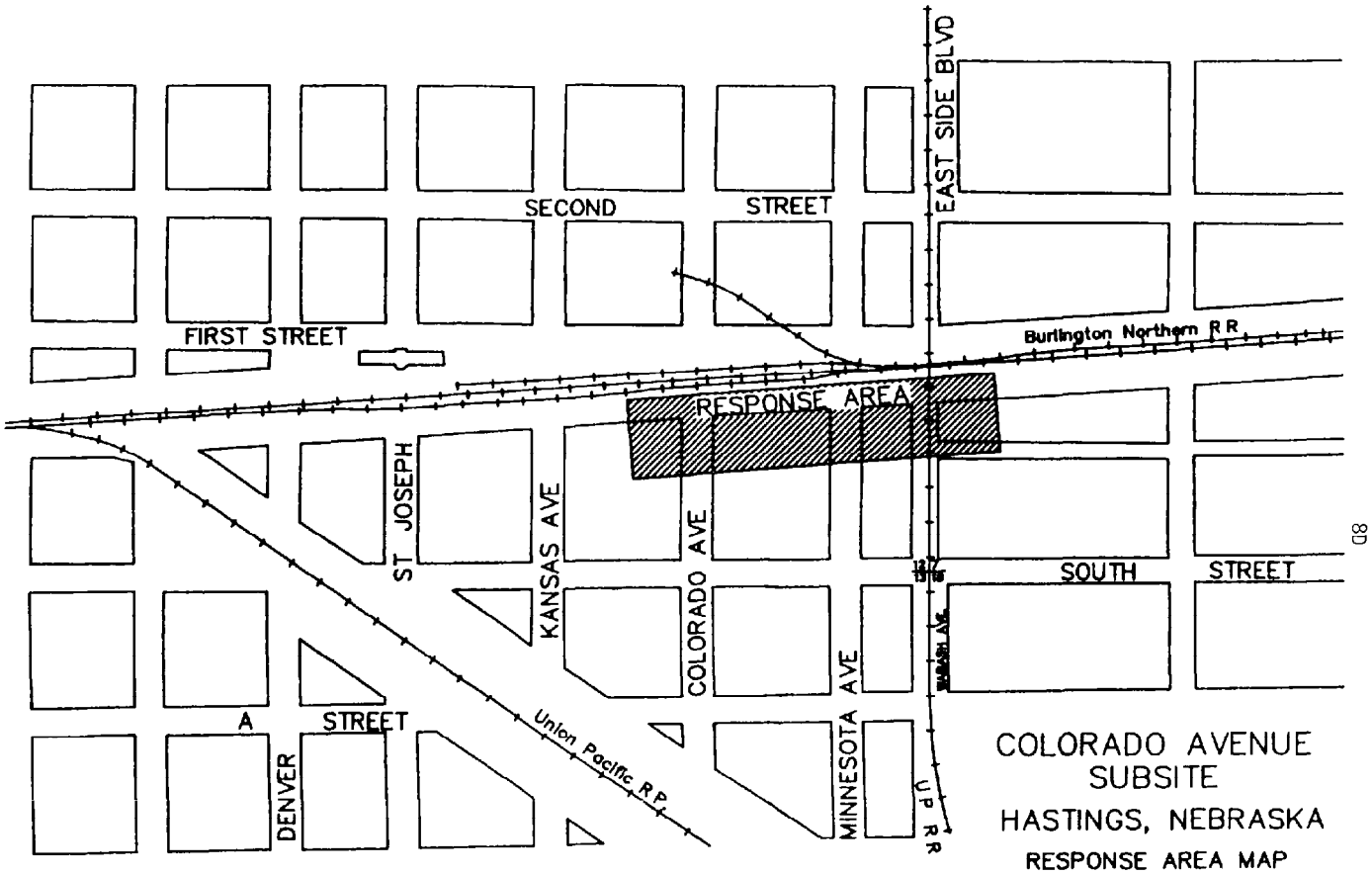
Gr d water data (1985 1987) p esented here eflects disc ti ed se of four wells (M 3 M 10 M 12 a d M 18) wh ch have si ce been take out of regula ser ice and/o d sco nected f om the dist ibution system As sho n by Table 2 2 highe co taminant concentrations e e fo nd i 1983 when the wells ere n use

Dat e obta d f om the REM II g ou d te in estigation eport fo Hastings Ground Water Contamination May 7 1987 and quarterly g ou d ater sampling c ducted si ce December 1986

Carbo tetrachloride rangi g from 22 26 ug/l was detected in well M 3 during this pe iod

ND Not detected

Above analyses were repo ted by EPA Labs a d EPA Co tract Labs



COLORADO AVENUE SUBSITE
HASTINGS, NEBRASKA
RESPONSE AREA MAP
Figure 3

HAR.256

water In order to evaluate this public health impact a risk assessment which evaluates risks to users as a result of the exposure was conducted The risk assessment addressed the health effects associated with ingestion of contaminated ground water This assessment provides a quantitative estimate of risk levels under existing conditions -- that is in the absence of remedial action This serves as a baseline against which the need for remedial action is evaluated The risk assessment included calculations of the human dosage for contaminants in ground water

Potential exposure pathways to humans from the use of contaminated ground water include

Ingestion of ground water
Inhalation of volatile chemicals released during water use
Direct dermal contact with contaminated water

Persons potentially at risk of exposure to the contaminants in ground water include users of private and industrial wells down gradient from the site and customers who depend on the CMS Inc public water supply east of Hastings Future users of the ground water would include communities located east of Hastings

Development of a list of indicator chemicals is the first stage in the characterization of risk Factors considered include maximum concentrations of contaminants at the site and their comparison to standards presence of contaminants in ground water samples collected down gradient from the site and carcinogenicity of contaminants Three compounds were ultimately selected and are listed in Table 2 Trichloroethene is considered the main contaminant of concern based on the above factors TCE is classified as a probable human carcinogen Degradation of TCE produces vinyl chloride which is classified as a human carcinogen

Because the overall incremental lifetime cancer risk shown in Table 2 exceeds current US EPA guidelines response action alternatives were developed so as to reduce the potential for human exposure to contaminated ground water This remedy will minimize the volume of contaminated ground water which will migrate from the Colorado Avenue site

The potential human health impact of the selected remedy has been investigated Calculations have been presented in EPA reports which show the need for air monitoring during cleanup actions As explained in the EE/CA air emissions controls will be used if needed The Agency will request an opinion from the Agency for Toxic Substances and Disease Registry (ATSDR) regarding proposed ambient air emission levels

Because the incremental cancer risks associated with direct contact to onsite soils are less than 1×10^{-6} it was determined

TABLE 2
CHRONIC DAILY INTAKE OF CARCINOGENIC CONTAMINANTS PRESENT IN GROUND WATER AND CALCULATION OF POTENTIAL INCREMENTAL LIFETIME CANCER RISK
COLORADO AVENUE SITE

Chemical	Maximum Concentration (ug/l)	Chronic Daily Intake (CDI) (mg/kg/day)	Carcinogenic Potency Factor $(mg/kg/day)^{-1}$	Incremental Lifetime Cancer Risk[a]
1 1-Dichloroethene	290	$8\ 3x10^{-3}$	0 58	$5x10^{-3}$ [C]
Tetrachloroethene	1 300	$3\ 7x10^{-2}$	$5\ 1x10^{-2}$	$2x10^{-3}$ [B2]
Trichloroethene	55 000	1 6	$1\ 1x10^{-2}$	$2x10^{-2}$ [B2]
Overall				$3x10^{-2}$

[a] EPA s carcinogen classification scheme
[A] = human carcinogen
[B2] = Probable human carcinogen on the basis of animal data
[C] = Possible human carcinogen

Source Table 3-4 Report of Investigation Hastings Ground Water Contamination Site Colorado Avenue Subsite REM II February 16 1987

that the surficial soils do not pose an imminent health threat to the workers at the site

SCOPE OF OPERABLE UNIT

This response action is an initial source control operable unit and is consistent to the extent practicable with Section 300 68(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) This initial source control operable unit is being implemented to protect public health and the environment by controlling the migration of contaminants from the soils to the ground water The operable unit addresses known areas of contamination in the sands and silts which overlie the aquifer is one of the the major concerns posed by the site This operable unit was initiated to deal with these concerns and is further described in the EE/CA document which was released for public comment

The initial action is fully consistent with all future site work including the ongoing ground water investigations In addition it is believed that the remedy will reduce overall costs of cleanup actions needed at this site

Because the incremental cancer risks associated with direct contact to onsite soils are less than $1x10^{-6}$ it was determined that the surficial soils do not pose an imminent health threat to the workers at the site

The selected remedy will be cost-effective because recovery and treatment of the hazardous substances in the soil-gas incorporates technologies that are proven and easily adapted to the Colorado Avenue site Costs associated with recovery and treatment of the contaminated ground water are significantly higher therefore delay of the source control implementation would increase the total response action costs for this site

NO SIGNIFICANT CHANGES

The EPA has selected an initial remedy consisting of soil vapor extraction at the Colorado Avenue subsite This remedy is identical to the preferred alternative identified in the EE/CA document released by EPA on February 3 1988 There are no significant changes to EPA's proposed cleanup plan

EVALUATION OF ALTERNATIVES

Remedial alternatives have been developed in order to meet the objectives of the Comprehensive Environmental Response Compensation and Liability Act of 1980 as amended (CERCLA) and to the extent practicable the NCP, 40 CFR Section 300 68 The process used to evaluate alternatives for this site is discussed in the EE/CA and is addressed briefly here

The first step in the evaluation of alternatives was to investigate technologies and determine which technologies may be

both feasible and suitable for the Colorado Avenue site The technologies were screened based on technical feasibility site conditions protectiveness of human health and the environment and regulatory requirements Table 3 lists the technologies that were considered in the screening process and whether or not the technologies were considered for further evaluation

Based on this initial screening response action alternatives were identified for development and evaluation of their ability to meet environmental laws and standards The viable alternatives were then developed to permit relative cost comparisons of the technically feasible alternatives The results of this evaluation were that four response alternatives were identified in addition to the NO ACTION alternative Section 121(d) of CERCLA as amended by the Superfund Amendments and Reauthorization Act of 1986 requires that remedial actions comply with applicable or relevant and appropriate requirements or standards (ARARs) under Federal and State environmental laws The EPA's findings with regard to protectiveness are shown in Table 4 Also shown in this table is the ability of the five source control alternatives to meet major regulatory requirements

SUMMARY OF ALTERNATIVES

CERCLA as amended and the National Contingency Plan require that each alternative developed including the no-action alternative, must be evaluated with respect to two major criteria overall protection of human health and the environment and compliance with applicable or relevant and appropriate environmental requirements Seven additional criteria are considered as a means to compare the alternatives These include

- Long-term effectiveness
- Reduction of toxicity mobility or volume
- Short-term effectiveness
- Implementability
- Cost
- State acceptance
- Community acceptance

Each alternative must be evaluated for the degree of on and offsite protection required (and thus to be provided) by the actions involved, as part of the overall effectiveness

The following summary will focus on significant evaluation criteria as they relate to the alternatives developed for the Colorado Avenue subsite

No-Action Alternative

The Agency has evaluated the no-action alternative for source control Because hazardous substances are known to exist in the soils above the aquifer the concept of a no-action

TABLE 3

SCREENING OF
POTENTIAL RESPONSE TECHNOLOGIES FOR
CONTAMINATED SOILS
COLORADO AVENUE SITE

Technology	Screening Result	
	Potentially Applicable	Not Developed
Excavation	X	
Incineration	X	
Flushing (with water)		X
Biodegradation		X
Composting		X
In situ soil vapor extraction	X	
In situ air stripping	X	
In situ stream stripping		X
Thermal processing		X
Capping	X	

Table 4

Summary of Alternatives Evaluation for Source Control Response Actions

Alternative	Is Response Protective	Ability to Meet Major Statutory & Regulatory Requirements*
No Action	No	No
Soil Vapor Extraction	Yes	Yes
Excavation with Onsite Treatment	Yes	Yes** (Partial)
Excavation with Offsite Treatment	Yes	Yes** (Partial)
Limited Excavation with Treatment Plus Soil Vapor Extraction	Yes	Yes

* The following potential ARARs have been identified and evaluated for remedial alternatives in this Record of Decision Federal laws are shown with the corresponding State regulations

Federal Resource Conservation and Recovery Act
- State Regulations Title 128 Title 132
Federal Safe Drinking Water Act
- State Regulations Title 118 Title 178
Federal Clean Water Act
- State Regulation Title 117
Federal Clean Air Act
- State Regulation Title 129

** Sand materials below silt-soils would not be treated therefore contaminants would remain below depth of excavation

alternative is not protective Moreover this alternative does not comply with cleanup objectives including protection of the drinking water aquifer for future use

Monitoring of downgradient water quality would help identify wells to be closed but would not prevent continued migration and would not assure availability of alternate water supplies to users Based on downgradient water quality data and the high levels of contamination at the Colorado Avenue site the no-action alternative would not reduce migration of contaminants and may permit the level of risk to increase due to the amount of contamination in the soils Regarding other long-term aspects of the no-action alternative, long-term reliability of monitoring would decrease with the passage of time and with distance from the site There would be no reduction of mobility toxicity or volume therefore no action would create the highest likelihood for future exposure to hazardous substances being released to the environment

Under the 1986 amendments to CERCLA should a remedial action result in hazardous substances pollutants or contaminants remaining at the site the remedial action taken must be reviewed within five years to evaluate if the actions taken are protective of public health and the environment Potential remedial action costs would thus be maximized since all the contaminants present might have to be remediated as a result of this review Natural attenuation of contamination is the only process that could reduce such costs but due to the toxicity and concentrations of the wastes present this alternative would not be protective

In Situ Soil Vapor Extraction

This alternative involves treating contaminated soils in-place without excavation This alternative will provide permanent removal and destruction of contaminants and thereby achieve a reduction in mobility toxicity and volume

The need for direct action was stressed in public comments submitted to the Agency This alternative is acceptable to the State of Nebraska and the community

In a vapor extraction system VOCs are removed from soil by applying a vacuum and using a conventional industrial blower and standard valving piping and instrumentation Vacuum extraction has been used successfully in full-scale operations for removing many types of VOCs in soils ranging from fine-grained silts to coarse-grained sand and gravels The extracted vapor may have to be treated by a vapor phase activated carbon system if significant air emissions result from implementation of this response alternative This alternative was retained for cost evaluation

Excavation on Onsite Incineration

This alternative employs soil remediation and air treatment

technologies that have been fully demonstrated to be effective Incineration following soils excavation will permanently destroy organic compounds present at the Colorado Avenue site This alternative would comply with requirements of 1986 amendments to CERCLA to reduce mobility toxicity or volume This alternative would require air quality monitoring and other precautions to minimize migration of air-borne contaminants from the ite

This alternative would address contaminated soils only to the feasible limit of excavation depth Therefore additional soil remediation measures would likely be needed to achieve objectives of minimizing further migration of contaminants to the ground water This alternative was retained for cost evaluation to provide cost comparisons to other response action alternatives

Excavation and Offsite Incineration

In terms of long-term public health and environmental protection and reliability this alternative is similar to the alternative described above (involving onsite incineration) Under this alternative the excavated soil will be transported offsite for incineration treatment at a RCRA-permitted facility which will require contingency planning in the event of a highway accident Air quality monitoring and other precaution may also be required during soil excavation to minimize migration of air-borne contaminants from the subsite

Implementation of this alternative for treatment of all contaminated soils may not be cost-effective but it could be used in combination with another alternative (such as vapor extraction) by excavating localized areas of high contamination and incinerating this soil offsite This alternative is retained for cost evaluation to provide cost comparisons to other response action alternatives

Combination of Excavation and Incineration with In Situ Soil Vapor Extraction and Treatment

This alternative involves excavating localized areas where high concentrations of volatiles are present in soils and destruction by incineration (onsite or offsite) The remaining soils will be treated by in situ vapor extraction and the VOC air emissions treated by vapor phase carbon adsorption This alternative was not selected due to the fact that the highest levels of contamination found are in the sand materials at depths below the silts Deep excavations were not considered feasible for implementation at the Colorado Avenue site Unit costs (i e , estimated cost per yard of soil excavated) were determined to provide cost comparisons to other response action alternatives

Cost Effectiveness

Cost comparison data is shown by Table 5 These estimates were prepared based upon engineering judgments regarding implementability of the alternatives evaluated for source control at the Colorado Avenue site Clearly soil vapor extraction is

TABLE 5
COST COMPARISON OF RESPONSE ACTION ALTERNATIVES
FOR CONTAMINATED SOILS
COLORADO AVENUE SITE
($ x 1 000)

Alternative	Total (a) Capital Cost	First Year O&M Cost (b)	Unit Cost ($/Cubic Yard)
In situ vapor extraction and treatment	$1 605	$527	84
Excavation and onsite incineration	25 998(c)	-	610
Excavation and offsite incineration	28 055(c)	-	660
Excavation and incineration of hotspots in combination with in situ vapor extraction and treatment	(d)	-	1 300 (Excavation and onsite incineration) 1 500 (Excavation and offsite incineration)

Notes (a) Estimate includes gas extraction system air treatment system engineering design construction management and other contingency costs

(b) Estimates include power costs maintenance labor monitoring of air and soils and contingency costs

(c) Estimates include all costs associated with site work for an estimated volume of 42 700 cubic yards of soil

(d) Total cost for this alternative was not estimated Based on site sampling data no localized zones of high contamination at the surface were identified

(e) A total present worth estimate for source control implementation has been prepared The estimated cost is $3 603 000 based on -- a five-year operating period a 10 percent discount rate and projection of the first year O&M costs over the five-year operating period

the more cost-effective alternative

SELECTED ALTERNATIVE

Based on available data and analysis conducted to date the U S EPA selected Soil Vapor Extraction as the most appropriate solution for meeting the goals of the source control operable unit at the Colorado Avenue site The characteristics of Soil Vapor Extraction that are considered most important are

- The alternative provides protection to human health and the environment from the potential threats associated with no action
- The alternative limits migration of contaminants to the aquifer at the site
- The alternative provides for compliance with applicable laws and regulations
- The alternative is consistent with additional site actions and will be compatible with the final site remedy

The Regional Administrator retains the authority to make changes in the scope and nature of source control actions to be undertaken at this site If new information or additional environmental data warrants a change then the impacts of the suggested change will be reviewed to determine if any significant departure from the selected alternative does in fact exist Cost impact of any proposed changes will be taken into account

Selection of the vapor extraction source control remedy is being made at this time however a pilot project is planned prior to full-scale implementation of the proposed actions This pilot scale testing for an active gas extraction system will provide the following data

1 rate of gas withdrawal and air recharge
2 information to properly size the vacuum/air withdrawal system components
3 radius of influence and other information to design the final gas extraction well network
4 calculations of air emissions resulting from the soil vapor extraction process
5 information to demonstrate the capability to control air emissions and determine whether or not air monitoring would be required during the cleanup phase
6 information to select and design the most cost effective system for air emissions treatment
7 information to design the gas monitoring well network

Pending successful completion of the pilot the most cost-

effective design will be prepared for the source control remedy

CLEAN-UP LEVELS

The initial source control operable unit is being implemented for the purpose of controlling contaminant migration not restoration of the aquifer to drinking water standards Therefore no cleanup levels are being established at this time The vapor extraction system will initially operate under controlled conditions to provide for collection and analysis of operational data This data will be used to refine final design information and to establish effectiveness of the vapor extraction system Cleanup effectiveness will be evaluated based on volume of contaminants recovered from the soils Review and decision-making regarding cleanup levels will be closely coordinated with the State of Nebraska Since no direct contact health risks exist at the site a cleanup level for soils can be addressed later

As previously stated recovery of volatiles by SVE will be less costly than treating large volumes of contaminated ground water at a future date Therefore the volume of volatile contaminants recovered will be one measure of success of the selected remedy Ground water monitoring is expected to show a decreased concentration of contaminated ground water migrating from the site These monitoring data will be direct measures of success of the selected remedy The anticipated result is that the duration of any long-term actions will be decreased by this remedy

The Agency believes that the maximum contaminant levels established under authority of the Safe Drinking Water Act are relevant and appropriate for ground water remedies However this initial operable unit does not provide for treatment of ground water at the Colorado Avenue subsite Section 121 of CERCLA as amended does provide for waiver of the requirement to attain MCLs where an interim remedy is to be selected Air emissions will be monitored to assure no significant air emissions will be created by this remedy

OPERATION AND MAINTENANCE

The recommended alternative requires a certain degree of annual operation and maintenance (O&M) activity to ensure proper operation of the system and compliance with environmental laws and regulations The costs of O&M will depend on volume of contaminants recovered and the size of the completed vapor extraction system An O&M plan will be developed during remedial design after the initial phase of operation and testing of the system

A ground water monitoring plan will also need to be developed and implemented to demonstrate reduced migration of contaminants in the ground water This plan will be incorporated into the O&M plan Dravo Corporation has been requested to

assume responsibility for the O&M Marshalltown Instruments also has potential liability for O&M costs The EPA will assist the PRPs during transition

STATUTORY FINDINGS

The U S EPA and the State of Nebraska believe that this remedy will satisfy the statutory requirements for providing protection of human health and the environment attaining applicable or relevant and appropriate requirements of other environmental statutes will be cost-effective, will utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable and satisfies the statutory preference for treatment of hazardous substances

SCHEDULE

The following are the key milestones for implementation of the remedial action in the event that negotiations with potentially responsible parties are not successful

Approve Remedial Action (execute ROD)	September 1988
Initiate Remedial Design (Funding)	September 1988
Initiate Remedial Action (Operational Testing)	December 1988
Complete Remedial Design	September 1989

FUTURE ACTION

Ground water monitoring wells downgradient from the site will continue to be sampled and a technical approach for plume management will be developed Agency decision-making regarding ground water treatment will be discussed with the State of Nebraska prior to preparation of a Record of Decision for ground water treatment